

REMARKS

Applicant has reviewed and considered the Office Action mailed on May 3, 2007 and the references cited therein.

Claims 1, 8, 15, 26, and 29 are amended and no claims are added or canceled; as a result, claims 1-33 are still pending in this application.

35 USC § 102 Rejection of the Claims

Claims 1, 5-10, 13, 26-30, 33 were rejected under 35 USC § 102(b) as being anticipated by *Okada et al.* (US Publication 2002/0003773).

Claim 1 is an independent claim directed to an apparatus comprising: (a) a first phase shifter to provide subcarrier dependent phase shifts to modulation symbols associated with an orthogonal frequency division multiplexing (OFDM) signal to generate first phase shifted modulation symbols, wherein said modulation symbols correspond to subcarriers of the OFDM signal; and (b) a first inverse discrete Fourier transform unit to convert said first phase shifted modulation symbols from a frequency domain representation to a time domain representation for transmission into a wireless channel; wherein said subcarrier dependent phase shifts are selected to convert a wireless channel displaying flat multipath fading into a wireless channel displaying frequency selective multipath fading.

Okada et al. does not disclose a first phase shifter to provide subcarrier dependent phase shifts to modulation symbols “wherein said subcarrier dependent phase shifts are selected to convert a wireless channel displaying flat multipath fading into a wireless channel displaying frequency selective multipath fading.” As described in paragraph 94 through paragraph 107 of Okada et al., the frequency converters 4-1, 4-2, and 4-3 of Fig. 12 are used to shift the center frequencies of corresponding channel data received from channel encoders 2-1, 2-2, and 2-3 by amounts that allow the data to be multiplexed together in multiplexer 5. The frequency converters 4-1, 4-2, and 4-3 each include a phase shifter 11 (see Fig. 13 of Okada et al.) that is used to carry out the corresponding frequency conversion. The phase shifters 11 within the frequency converters 4-1, 4-2, and 4-3 are not used to impart subcarrier dependent phase shifts that are “selected to convert a wireless channel displaying flat multipath fading into a wireless channel displaying frequency selective multipath fading” as recited in claim 1.

Based on the foregoing, it is submitted that claim 1, as amended, is not anticipated by Okada et al. Reconsideration and allowance of claim 1 is therefore respectfully requested. A similar argument applies to amended independent claims 8, 26, and 29.

Please note that the Applicants are confused as to the Examiner's method for identifying disclosed subject matter within Okada et al. For example, in the rejection of claim 1, the Examiner refers to language within column 10, line 64 to column 11, line 26 and then quotes the language. Reference to the specification of Okada et al. shows that this quoted language is in fact within column 12 of the application. Likewise, the Examiner refers to language within column 11, lines 47-51 that is actually located within column 12. In rejections that do not quote the actual text of the cited passage, the Applicants find it almost impossible to identify what text the Examiner is referring to. In future communications, it is respectfully requested that the Examiner identify passages within U.S. patent application publications by paragraph number and line(s) within the paragraph.

Claims 5-7, claims 10 and 13, claims 27-28, and claims 30 and 33 are dependent claims that depend, either directly or indirectly, from base claims 1, 8, 26, and 29, respectively. Consequently, these claims are allowable for at least the same reasons as their respective base claims. These claims also provide further bases for patentability. For example, claim 6 further defines the first phase shifter of claim 1 as providing "subcarrier dependent phase shifts to said modulation symbols based on an approximate coherence bandwidth associated with the apparatus." Okada et al. does not teach the provision of subcarrier dependent phase shifts that are based on an approximate coherence bandwidth. The Examiner takes the position that Okada et al. discloses this subject matter in column 10, lines 64-67 and in column 1, lines 21-25. As described above, Applicants are not sure which passage the Examiner is referring to within Okada to show this subject matter. However, a text search of the entire document shows that the word "coherence" is not used therein. If the Examiner maintains this rejection, it is respectfully requested that he identify with specificity (i.e., paragraph number and lines number(s)) the teaching within Okada et al. relating to the use of an approximate coherence bandwidth. Claims 7, 13, and 33 also recite an "approximate coherence bandwidth," so a similar request is made with regard to these claims.

Claims 15-25 were rejected under 35 USC § 102(a) as being anticipated by *Menon et al.* (US Patent 6940917).

Claim 15 is an independent claim directed to an apparatus comprising: (a) an interleaver to separate a serial input stream of modulation symbols into N spatial streams, where N is a positive integer greater than 1; and (b) a steering unit to receive said N spatial streams and to steer the associated modulation symbols into M antenna paths, where M is a positive integer greater than 1, wherein said steering unit provides subcarrier dependent phase shifts to modulation symbols associated with at least one of said N spatial streams, wherein said subcarrier dependent phase shifts are selected to convert a wireless channel displaying flat multipath fading into a wireless channel displaying frequency selective multipath fading.

Menon et al. does not disclose a steering unit that provides subcarrier dependent phase shifts to modulation symbols “wherein said subcarrier dependent phase shifts are selected to convert a wireless channel displaying flat multipath fading into a wireless channel displaying frequency selective multipath fading.”

Based on the foregoing, it is submitted that claim 15, as amended, is not anticipated by Menon et al. Reconsideration and allowance of claim 15 is therefore respectfully requested.

Claims 16-25 are dependent claims that depend either directly or indirectly from independent claim 15. Consequently, these claims are allowable for at least the same reasons as claim 15. These claim also provide further bases for patentability. For example, claim 23 further defines the steering unit of claim 15 as providing “subcarrier dependent phase shifts to modulation symbols associated with at least two spatial streams, wherein different phase sequences are used for each of said at least two spatial streams.” Menon et al. does not teach the provision of different subcarrier dependent phase shift sequences for each of at least two spatial streams. Claim 24 further defines the steering unit of claim 15 as providing “subcarrier dependent phase shifts to modulation symbols associated with N-1 of said N spatial streams, wherein different phase sequences are used for each of said N-1 spatial streams.” Menon et al. does not teach the provision of different subcarrier dependent phase shift sequences for N-1 of N spatial streams. Claim 25 further defines the steering unit of claim 15 as providing “subcarrier dependent phase shifts to modulation symbols associated with each of said N spatial streams, wherein different phase sequences are used for each of said N spatial streams.” Menon et al.

does not teach the provision of different subcarrier dependent phase shift sequences for each of N spatial streams.

35 USC § 103 Rejection of the Claims

Claims 2-4, 14 were rejected under 35 USC § 103(a) as being unpatentable over *Okada et al.* (US Publication 2002/0003773) in view of *Ladstatter* (US Patent 4112430).

Claims 2-4 and claim 14 are dependent claims that depend either directly or indirectly from independent claims 1 and 8, respectively. Consequently, these claims are allowable for at least the same reasons as their respective base claims. These claims also provide further bases for patentability. For example, claim 2 adds to the apparatus of claim 1 “a second phase shifter to provide subcarrier dependent phase shifts to said modulation symbols associated with said OFDM signal to generate second phase shifted modulation symbols, wherein said second phase shifter provides different subcarrier dependent phase shifts to said modulation symbols than said first phase shifter” and “a second inverse discrete Fourier transform unit to convert said second phase shifted modulation symbols from a frequency domain representation to a time domain representation; wherein said first inverse discrete Fourier transform unit is associated with a first antenna path and said second inverse discrete Fourier transform unit is associated with a second antenna path.” Neither *Okada et al.* nor *Ladstatter* disclose or suggest, either alone or in combination, first and second phase shifters to provide different subcarrier dependent phase shifts to the same modulation symbols for delivery to two different antennas. *Okada et al.* provides different frequency conversion to different channel data within frequency converters 4-1, 4-2, and 4-3 (see Fig. 12). After frequency conversion, this data is multiplexed together for processing within a single IFFT and transmission from a single antenna. *Ladstatter* was cited simply to show the use of a different IFFT unit with different antennas. It is submitted that a person of ordinary skill in the art would not find it obvious to provide the claimed structures in view of the cited combination of references. A similar argument applies to dependent claim 3.

Claims 11 and 31 were rejected under 35 USC § 103(a) as being unpatentable over *Okada et al.* (US Publication 2002/0003773) in view of *Daudelin* (US Patent 4716376).

Claim 11 and claim 31 are dependent claims that depend either directly or indirectly from independent claims 8 and 29, respectively. Consequently, these claims are allowable for at least

the same reasons as their respective base claims. These claims also provide further bases for patentability.

Claims 12 and 32 were rejected under 35 USC § 103(a) as being unpatentable over *Okada et al.* (US Publication 2002/0003773) in view of *Kumagai et al.* (US Patent 5796307).

Claim 12 and claim 32 are dependent claims that depend either directly or indirectly from independent claims 8 and 29, respectively. Consequently, these claims are allowable for at least the same reasons as their respective base claims. These claims also provide further bases for patentability.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (480-948-3745) to facilitate prosecution of this application.

Respectfully submitted,

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By their Representatives,

Customer Number: 45643
480-948-3745

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 25th day of July, 2007.

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